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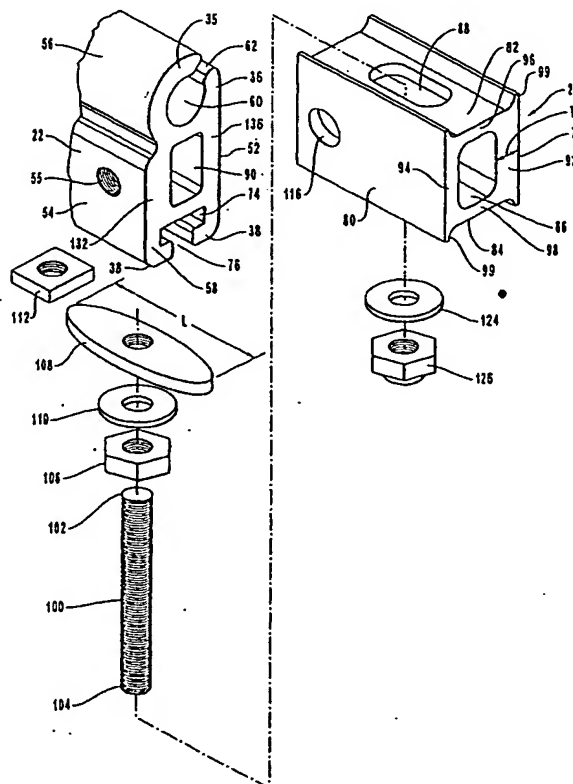
INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(51) International Patent Classification 7 : G09F 17/00		A1	(11) International Publication Number: WO 00/57394
			(43) International Publication Date: 28 September 2000 (28.09.00)
(21) International Application Number: PCT/US00/07206 (22) International Filing Date: 17 March 2000 (17.03.00) (30) Priority Data: 09/274,948 23 March 1999 (23.03.99) US 09/397,467 16 September 1999 (16.09.99) US (71) Applicant: MOBILE IMPACT, INC. [US/US]; 601 West Boro Street, Kaysville, UT 84037 (US). (72) Inventors: GRIESEMER, Daniel, A.; 8204 South Bettina Lane, Sandy, UT 84093 (US). BAUER, Paul, F.; 1169 North 250 West, Layton, UT 84041 (US). (74) Agents: TANGREN, Dana, L. et al.; Workman, Nydegger & Seeley, 1000 Eagle Gate Tower, 60 East South Temple, Salt Lake City, UT 84111 (US).			(81) Designated States: AE, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CR, CU, CZ, DE, DK, DM, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, TZ, UA, UG, UZ, VN, YU, ZA, ZW, ARIPO patent (GH, GM, KE, LS, MW, SD, SL, SZ, TZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG). Published With international search report.

(54) Title: ASSEMBLY FOR MOUNTING FLEXIBLE SHEET ON STRUCTURE

(57) Abstract

A mounting assembly includes a mounting bracket (250) and a retention bracket (252) configured for rigid attachment to a structure. A coupling channel (284) configured to receive the top edge of a display sheet extends along the length of the mounting bracket. The retention bracket has a plurality of holes (312) configured to receive a spring (316). One end of the spring is attached to the display sheet and the other end is attached to a pin (322) which puts pressure on the retention bracket, thus keeping the sheet in tension. In an alternative embodiment, the retention bracket is replaced by an adjustment bracket (22) and brace (24). The bracket and the brace are connected by a plurality of pins (100) which are adjusted by a retention nut (108). By tightening the nut, the display sheet may be tensioned.



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ASSEMBLY FOR MOUNTING FLEXIBLE SHEET ON STRUCTURE

BACKGROUND OF THE INVENTION

1. The Field of the Invention

The present invention relates to mounting assemblies for flexible sheets and, more specifically, assemblies for mounting flexible sheets under tension on any desired structure.

2. Present State of the Art

Billboards are a popular and effective advertising medium. A conventional billboard comprises an enlarged upstanding frame having an expansive plain or board attached thereto. Advertising can be painted directly onto the face of the board. More commonly, however, advertising is printed or silkscreened onto enlarged vinyl or paper sheets which are then secured to the board by an adhesive. Most billboards are located adjacent to a freeway or other roadway so as to maximize public exposure.

Although conventional billboards are effective, the demand for additional advertising has promoted the need to find unique ways and locations for displaying advertising. For example, there is an increased demand for affixing advertising onto the side of buildings or other previously standing structures. The problem encountered, however, is that it is often difficult, and at times undesirable, to mount a conventional display board onto the side of such structures. Furthermore, many zoning and building restrictions preclude the attachment of a display board onto the side of buildings. The display boards are often rejected on the grounds that the display boards comprise a separate element that extends too far from the side of the building. Similarly, it is often impractical or undesired to secure an advertising sheet directly onto the side of a building or structure by an adhesive. Often, the side of the building is insufficiently flat to secure the advertising sheet. Furthermore, use of the adhesive can mar the building surface.

Additional desired advertising space is found on the side of vehicles such as buses, automobiles, and tractor trailers. Here again, legislation precludes the attachment of large display boards onto the side of vehicles. Such boards are often rejected on the grounds that the boards project too far from the side of the vehicles. In one approach to overcome this limitation, silkscreen or other printed advertising sheets have been made for direct attachment onto the side of a vehicle by an adhesive. Such advertising sheets, however, can be difficult and labor intensive to attach and remove. Furthermore, the removal of such sheets can pull off the vehicle paint.

Although vinyl advertising sheets can simply be directly bolted to the side of a trailer or vehicle, conventional bolting makes it difficult to adequately stretch or tension the sheets so that they have a flat uniform appearance. Furthermore, it is often desirable

to quickly exchange or replace advertisement sheets. This is particularly important with regard to truck trailers wherein the advertising sheets must be replaced during the period in which the trailer is being either loaded or unloaded. Conventional mounting systems are often labor intensive and time consuming in the replacement process. Furthermore, conventional mounting systems can be relatively heavy and occupy a considerable portion of available space. This can be problematic on truck trailers where advertising space is limited and it is desirable to minimize extra weight.

In one attempt to overcome some of the above problems, conventional cranks have been mounted onto the side of a truck trailer. Advertising sheets are formed having straps projecting from the side thereof. Accordingly, by tightening the straps through the cranks, the advertising sheets can be secured to the side of the trailer. Such an assembly, however, requires specially made advertising sheets wherein the straps must be aligned with the cranks. Furthermore, the cranks can produce localized stresses on the advertising sheets at the site of the straps, thereby producing an uneven appearance. Finally, the cranks project relatively far from the side of the trailer, thereby decreasing the aesthetic appearance and increasing the potential danger to those standing adjacent to the trailer.

An additional problem with cranks and other conventional systems used to removably secure advertising sheets is that such systems do not account for the expansion or contraction of the advertising sheets. That is, depending on the type of material an advertising sheet is comprised of, the advertising sheet can expand when exposed to hot weather and contract when exposed to cold weather. Expansion of the advertising sheet can result in the advertising sheet becoming wavy or flapping in the wind, thereby distracting from its appearance. Conventional systems require that the advertising sheet be manually retightened to prevent such sagging.

BRIEF SUMMARY OF THE INVENTION

In accordance with the invention as embodied and broadly described herein, a mounting assembly is provided for removably securing a flexible display sheet to a structure such as the side of a building or vehicle. The display sheet has a front face that extends to an encircling perimeter edge. Secured at the perimeter edge is a small diameter retention line. The display sheet is configured such that advertising can be printed, silkscreened, or otherwise disposed on the front face thereof.

In one embodiment, the mounting assembly includes a mounting bracket, adjustment bracket, and brace. The mounting bracket and brace are configured for ridged attachment to the side of the structure, such as by bolts. The mounting bracket has a coupling channel that extends along a first end thereof and communicates with the exterior through a narrow mouth. The coupling channel and mouth are configured to

slidably receive and retain the top edge of the display sheet when the mounting bracket is rigidly mounted to the structure.

The adjustment bracket has an front face extending between a first end and an opposing second end. A coupling channel also extends along the first end of the adjustment bracket and communicates with the exterior through a narrow mouth. The coupling channel and mouth are configured to slidably receive and retain the bottom edge of the display sheet such that the front face of the adjustment bracket can be freely disposed adjacent to the structure.

A receiving channel extends along the second end of the adjustment bracket and communicates with the exterior through a narrow mouth. A plurality of retention nuts are slidably disposed within the receiving channel. The retention nuts are configured to preclude annular rotation therein. The first end of a threaded bolt is screwed into each retention nut such that each bolt projects through the mouth of the receiving channel to an opposing second end. A positioning nut is also threaded onto each bolt and selectively biased against the exterior of the adjustment bracket so as to secure each bolt in a desired location along the length of the adjustment bracket.

The brace has an front face that also extends between a first end and an opposing second end. A plurality of spaced apart elongated slots extend through the brace between the opposing ends. Once the brace is secured to the structure, the second end of each bolt is disposed through a corresponding slot on the brace. An adjustment nut is then threadedly engaged at the second end of each bolt such that as each adjustment nut is advanced, each adjustment nut biases against the brace causing each bolt and the attached adjustment bracket to advance towards the brace. As a result, the display sheet is vertically tensioned between the mounting bracket and the adjustment bracket.

If desired, a similar assembly can also be mounted along the sides of the display sheet so as to also horizontally tension of the display sheet. Once the display sheet is tensioned, a cover comprised of linear and corner members is mounted to the mounting and adjustment brackets so as to substantially cover the mounting and adjustment brackets, brace, and perimeter edge of the display sheet over the structure.

In an alternative embodiment, the mounting assembly includes an elongated mounting bracket and an elongated retention bracket. The mounting bracket and retention bracket are rigidly attached flush to the side of a structure in spaced apart parallel alignment. A coupling channel extends along the length of the mounting bracket and communicates with the exterior through a narrow mouth. The coupling channel is configured to slidably receive and retain a top edge of the display sheet.

The retention bracket has a plurality of spaced apart holes transversely extending therethrough. Each hole is configured to receive a corresponding spring. Each spring has

5 a first end selectively attached to a bottom edge of the display sheet. Once a spring is attached to the display sheet, the second end of the spring is pulled through a corresponding hole on the retention bracket. A pin is then secured to the second end of the spring, thereby securing the display sheet between the mounting bracket and the retention bracket under the biased tension of the springs.

If desired, a similar assembly can also be mounted along the sides of the display sheet so as to also horizontally tension of the display sheet. Once the display sheet is tensioned, corner brackets can be mounted to the mounting brackets and retention brackets so as to cover and protect the corners of the display sheet.

10 The inventive mounting assemblies have a variety of benefits over conventional systems. For example, as a result of the mounting bracket, brace, and retention bracket each being disposed flush against the structure, the mounting assemblies project only a minimal distance from the structure. As a result, the mounting assemblies create a minimal potential hazard and are generally acceptable under current regulations for placement on the side of vehicles and buildings.

15 Furthermore, as a result of the mounting assemblies being positioned flush against a structure, the display sheets secured thereto are also mounted substantially flush against the structure. In one embodiment, the mouth extending from the coupling channel on the mounting bracket faces towards the structure so that the display sheet is disposed directly adjacent to the structure.

20 The inventive mounting assemblies are also unique in that once the assemblies are mounted on a structure, the display sheets can be easily and quickly replaced. That is, by simply removing the springs or loosening the adjustment nuts, the display sheets can be easily slid out of the coupling channel on the mounting bracket and adjustment bracket. A new display sheet can then be replaced.

25 Another benefit of the present invention is that the display sheet is held tight under the tensioning force of the expandable springs. As a result, even when a display sheet expands or contracts based on weather conditions, the display sheet is continually held under tension.

30 These and other objects, features, and advantages of the present invention will become more fully apparent from the following description and appended claims, or may be learned by the practice of the invention as set forth hereinafter.

BRIEF DESCRIPTION OF THE DRAWINGS

35 In order that the manner in which the above-recited and other advantages and objects of the invention are obtained, a more particular description of the invention briefly described above will be rendered by reference to specific embodiments thereof which are illustrated in the appended drawings. Understanding that these drawings depict

only typical embodiments of the invention and are not therefore to be considered to be limiting of its scope, the invention will be described and explained with additional specificity and detail through the use of the accompanying drawings in which:

Figure 1 is a side view of one embodiment of an inventive assembly securing a flexible display sheet to the side of a truck;

Figure 2 is a front view of the assembly shown in Figure 1 having the cover exploded therefrom;

Figure 3 is a cross sectional side view of the display sheet shown in Figure 2;

Figures 4 and 5 are cross sectional side views of the assembly shown in Figure 1 at spaced apart locations;

Figure 6 is an exploded perspective view of a portion of the assembly shown in Figure 5;

Figure 7 is a perspective view of an alternative bracket for the assembly shown in Figure 6.

Figure 8 is a side view of an alternative embodiment of an inventive mounting assembly securing a flexible display sheet to the side of a truck;

Figures 9A-9C are cross sectional side views of alternative display sheets shown in Figure 8;

Figure 10 are cross sectional side view of the mounting assembly shown in Figure 8;

Figure 11 is a perspective view of the retention bracket of the mounting assembly shown in Figure 10;

Figure 12 is a perspective view of an alternative embodiment of the mounting assembly shown in Figure 10; and

Figure 13 is a cross sectional side view of the retention bracket shown in Figure 12.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

Depicted in Figure 1 is one embodiment of an inventive mounting assembly 10 incorporating features of the present invention. Mounting assembly 10 is configured for securing a flexible display sheet 12 to a structure 14. In the embodiment depicted, structure 14 comprises a side 16 of a cargo truck 18. As used in the specification and appended claims, the term "structure" is broadly intended to include any type of structure on which it is desired to mount a display. By way of example and not by limitation, the structure can include a trailer, bus, automobile, wall, building, support frame, billboard, and the like.

Depicted in Figure 2, display sheet 12 has a front face 32 that extends to a perimeter edge 33. Although display sheet 12 can have any desired configuration, in the

embodiment depicted, display sheet 12 has a substantially rectangular configuration wherein perimeter edge 33 includes a top edge 4, a bottom edge 5, and opposing side edges 6 and 7. Corners 8 of display sheet 12 are cut.

5 In the embodiment depicted in Figure 3, display sheet 12 comprises a display portion 40 having a sheet-like configuration extending between opposing edges 42 and 44; retention line 46; and means for securing retention line 46 to edges 42 and 44 of display portion 40. Display portion 40 can be made of any sheet-like material such as paper, extruded sheets such as vinyl, or woven fabrics such as cotton, nylon, or other synthetic materials. Advertising, logos, signs, pictures, drawings, or any other printing can be positioned on display portion 40 such as by conventional printing, adhesion, silk screening, or drawing.

0 Retention line 46 has a diameter that is greater than the thickness of display portion 40. As used in the specification and appended claims, the term "retention line" is broadly intended to include relatively small diameter elongated members which can be either flexible or rigid. In one embodiment, retention line 46 comprises an extruded flexible plastic line. In alternative embodiments, retention line 46 can comprise a dowel or stylet made from materials such as wood, plastic, or metal; cord; tubing; rolled material; and the like. Retention line 46 can have a circular, square, rectangular, or any other polygonal or irregular transverse cross section.

0 By way of example and not by limitation, means for securing retention line 46 to display portion 40 includes a sleeve 48 having opposing ends folded together so as to enclose retention line 46 and edge 44 of display portion 40 therebetween. Sleeve 48 has an inside coating of a heat sealing material. Accordingly, as heat is applied to sleeve 48, sleeve 48 bonds to retention line 46 and display portion 40. Sleeve 48 and retention line 46 can be purchased as an integral unit referred to as Keder material which is available from Seattle Industrial Textile Company out of Seattle, Washington.

5 In the alternative, adhesives, staples, stitching, and other conventional mechanisms can also be used to secure sleeve 48 to display portion 40. In another alternative, a single sided sleeve 50 can be used to secure retention line 46 to edge 42. As a result, only one side of display portion 40 is secured to sleeve 50. Single sided sleeve 50 can be easier to align and attach to display portion 40.

0 In contrast to using a discrete sleeve, retention line 46 can also be secured to display portion 40 by simply folding the edge of display portion 40 over retention line 46 and securing the folded portion in place such as by stitching, staples, or adhesive. Similarly, retention line 46 can be directly secured to the edge of display portion 40 by stitching, staples, adhesives or the like.

The present invention also envisions that display sheet 12 need not include a discrete retention line or sleeve. For example, depicted in Figure 7 is a display sheet 65 having a perimeter edge 67 that is substantially flat. As such, display sheet 12 can have a continuous sheet-like configuration. Alternatively, the edges of a display sheet can be rolled up or bunched to form a simulated retention line thereat.

Depicted in Figure 2, mounting assembly 10 includes a mounting bracket 20, an adjustment bracket 22, and a brace 24. In one embodiment, brackets 20 and 22 and brace 24 are elongated members that are manufactured by extruding and drilling. The member are typically made from aluminum or plastic but can also be made from other materials. Brackets 20 and 22 and brace 24 typically each have a length in a range between about 1 meter to about 3 meters with about 2 meters to about 2.5 meters being more preferred. Typically, members of about 2.5 meters or less are preferred for ease in delivering the assembly through the mail. Brackets 20 and 22 and brace 24 are configured for securing and tensioning display sheet 12 on structure 14. A surrounding cover 26 is selectively mounted to brackets 20 and 22 so as to cover brackets 20 and 22, brace 24, and the perimeter edge of display sheet 12. As discussed later in greater detail, cover 26 comprises linear members 28 and corner members 30.

Depicted in Figures 4 and 6, adjustment bracket 22 has a front face 52 and an opposing back face 54 each extending between a first end 56 and an opposing second end 58. In one embodiment of the present invention, means are provided for securely retaining a portion of perimeter edge 33 of display sheet 12 along first end 56 of adjustment bracket 22. By way of example and not by limitation, an elongated arcuate finger 35 and substantially linear thumb 36 project at first end 56 so as to bound a coupling channel 60 that runs along the length of adjustment bracket 22. Coupling channel 60 has a substantially circular transverse cross section and communicates with the exterior through a narrow mouth 62. Coupling channel 60 is configured to slidably receive retention line 46 such that sleeve 48 passes through mouth 62. Retention line 46 has a diameter larger than mouth 62 so as to prevent retention line 46 from passing therethrough.

As depicted in Figures 4 and 6, one of the unique features of adjustment bracket 22 is that mouth 62 is configured to open towards structure 14 when front face 52 of adjustment bracket 22 is disposed against structure 14. This is a result of finger 35 having a greater length than thumb 36. Expressed in other terms, mouth 62 is configured such that a plane P_1 projecting from a central longitudinal axis A_1 of coupling channel 60 through mouth 62 intersects structure 14 when front face 52 of adjustment bracket 22 is disposed against structure 14. Accordingly, a portion 37 of flexible sheet 12 passing through mouth 62 is angled to intersect with structure 14. This positioning of mouth 62

minimizes the distance D between flexible sheet 12 and structure 14. In one embodiment, the maximum distance D_1 between flexible sheet 12 and structure 14 is typically less than about 3 cm with less than about 2 cm being preferred and less than about 1 cm being more preferred. The above measurements for the distance D are also applicable for the lateral distance between flexible sheet 12 and a front face 78 of brace 24, as discussed later, when front face 78 is mounted on structure 14.

The present invention also envisions a variety of other embodiments for securely retaining a portion of perimeter edge 33 of display sheet 12 along first end 56 of adjustment bracket 22. For example, depicted in Figure 7, an adjustable bracket 64 is shown having a first member 66 with a pin 68 projecting therefrom. A display sheet 65 has a grommet 70 formed at the edge thereof which is configured to receive pin 68. A second member 72 can then be secured to first member 66 over pin 68, so as to secure display sheet 65 to adjustable bracket 64. There are of course, a variety of other conventional attachments structures such as clips, clamps, hooks, fasteners, and the like that can also be used.

In yet another embodiment, mouth 62 can also be configured such that a plane P_2 projecting from the central longitudinal axis A_1 of coupling channel 60 through mouth 62 is disposed substantially parallel with structure 14 and/or face 52 of adjustment bracket 22.

Returning to Figure 6, a pair of inwardly facing substantially L-shaped fingers 38 are formed at second end 58 of adjustment bracket 22. Fingers 38 bound a receiving channel 74 longitudinally extending along second end 58 of adjustment bracket 22. In one embodiment, second channel 74 has a substantially rectangular transverse cross section and communicates with the exterior through a narrow mouth 76.

Longitudinally extending through the center of adjustment bracket 22 is a passageway 90. Extending between passageway 90 and front face 52 is an inside wall 136. An outside wall 132 extends between back face 54 and passageway 90. As will be discussed later with regard to cover 26, a threaded hole 55 projects into adjustment bracket 22 through back face 54.

Also depicted in Figure 6, brace 24 is an elongated member having an inside wall 92 with a front face 78 and an opposing outside wall 94 with a back face 80. Extending between walls 92 and 94 is a top wall 96 having a top surface 82 and an opposing bottom wall 98 having a bottom surface 84. Walls 92, 94, 96, and 98 bound a passageway 86 longitudinally extending through brace 24. Inside wall 92 and outside wall 94 each terminate at opposing ends with a freely exposed leg 99 projecting thereat. Legs 99 increase the stability of brace 24 and incorporate mechanical properties of an I-beam into brace 24. A plurality of spaced apart openings 88 extend in alignment through top wall

96 and bottom wall 98. Opening 88 is depicted as an elongated slot. In alternative embodiments, however, opening 88 can be a circular hole or any other desired shape.

In the embodiment depicted, brace 24 has a substantially square transverse cross section. In alternative embodiments, brace 24 can have a substantially U-shaped transverse cross section. For example, brace 24 can consist of walls 92, 96, and 98. In another embodiment, brace 24 can have a substantially L-shaped transverse cross section. For example, brace 24 can consist of walls 92 and 98.

Means are also provided for securing brace 24 to structure 14 such that front face 78 is biased against structure 14. By way of example, as depicted in Figures 5 and 6, an enlarged first aperture 116 extends through outside wall 94. A smaller second aperture 118 extends through inside wall 92. Apertures 116 and 118 are configured such that a bolt 120 having a head 122 can be passed through apertures 116 and 118 so that head 122 is biased against inside wall 93 when bolt 120 is screwed into structure 14. Alternative means for securing include wood or metal screws, nails, staples, adhesives, and other conventional fasteners known in the art. To support bolt 120 without failure of brace 24, in one embodiment inside wall 92 has a thickness T that is greater than the thickness of outside wall 94.

In another embodiment of the present invention, means are provided for selectively moving adjustment bracket 22 relative to brace 24 when brace 24 is rigidly mounted to structure 14 and adjustment bracket 22 is slidably disposed directly adjacent to structure 14. As depicted in Figure 6, by way of example and not by limitation, a coupling pin 100 is provided have a first end 102 and an opposing second end 104. In the depicted embodiment, coupling pin 102 comprises a threaded bolt.

Selectively threaded onto first end 102 of coupling pin 100 is a positioning nut 106 and a retention nut 108 with a washer 110 disposed therebetween. In this configuration, as depicted in Figure 4, retention nut 108 is slidably received within receiving channel 74 such that coupling pin passes through mouth 76 thereof. Positioning nut 106 can then be selectively tightened to bias via wash 110 against the exterior of adjustment bracket 22, thereby securing coupling pin 100 at a desired location along adjustment bracket 22 and precluding unwanted annular rotation of coupling pin 100.

Retention nut 108 is configured to be slidably received within receiving channel 74 so as to prevent annular rotation of retention nut 108 therein. For example, retention nut 108 is configured having an elongated elliptical configuration having a length L longer than the width of receiving channel 74. In an alternative embodiment, retention nut 108 can be replaced with a conventional square nut 112 wherein square nut 112 has a width comparable to the width of second channel 104 so as to prevent annular rotation

therein. One skilled in the art would appreciate that there are a variety of different configurations of nuts which can be used for threaded attachment with first end 102 of coupling pin 100 and yet would not facilitate annular rotation within receiving channel 74. The benefit of precluding annular rotation of the retention nut is that should a coupling pin fail, the coupling pin can simple be unthreaded and replaced without having to slide retention nut 108 out of receiving channel 74. This benefit is more apparent where there are a plurality of retention nuts and corresponding coupling pins disposed within receiving channel 74.

Second end 104 of coupling pin 100 is selectively pass through corresponding openings 88 on brace 24 such that second end 104 projects past bottom wall 98. A washer 124 and advancing nut 126 are then disposed on second end 104. In one embodiment, advancing nut 126 comprises a Nyloc nut. Advancing nut 126 is threaded onto coupling pin 100 such that advancing nut 126 biases via washer 124 against brace 24. Further tightening of advancing nut 126 pulls coupling pin 100 through brace 24 and thus draws adjustment bracket 22 towards brace 24.

The present invention also envisions a variety of alternative embodiments which can be used for selectively moving adjustment bracket 22 relative to brace 24. For example, coupling pin 100 can have a fixed head position at first end 102 as opposed to threaded nut 108. Furthermore, in contrast to having advancing nut 126, a lever arm can be positioned at second end 104 such that as the lever arm is biased against brace 24, coupling pin 100 is advanced through brace 24. In yet other embodiments, select nuts can be removed from the assembly by forming threaded apertures in one or both of adjustment bracket 22 and brace 24. In still other embodiments, the advancing nut can be replaced by forming holes that transversely extend through second end 104 of coupling pin 100. By manually pulling down on coupling pin 100, a key or pin can be inserted within the transverse hole so as to secure the coupling pin in the desired location. Those skilled in the art, will appreciate that there are a variety of other conventional methods that can similarly be used.

The present invention also includes means for securing top edge 4 of display sheet 12 to structure 14. By way of example and not by limitation, one embodiment of the means for securing top edge 4 comprises mounting bracket 20. As depicted in Figures 4 and 5, mounting bracket 20 has, for simplicity in manufacturing, a configuration substantially identical to adjustment bracket 22. As such, the reference characters identified with the elements of adjustment bracket 22 also relate to the elements of mounting bracket 20. Top edge 4 of display sheet 12 is thus secured to mounting bracket 20 by sliding retention line 46 within coupling channel 60.

As depicted in Figure 5, means are also provided for securing mounting bracket 20 to structure 14 such that front face 52 is biased against structure 14. By way of example, an enlarged first aperture 130 extends through outside wall 132. A smaller second aperture 134 extends through inside wall 136. Apertures 130 and 134 are configured such that a bolt 138 having a head 140 can be passed through apertures 132 and 136 so that head 140 is biased against inside wall 136 when bolt 138 is screwed into structure 14. Alternative means for securing include wood or metal screws, nails, staples, adhesives, and other conventional fasteners known in the art.

In alternative embodiments of the means for securing top edge 4 of display sheet 12 to structure 14, mounting bracket 20 can be manufactured without receiving channel 74. Mounting bracket 20 can also be configured in the same alternatives as discussed with regard to adjustment bracket 22. In yet other embodiments, since top edge 4 does not move, the means for securing top edge 4 can comprise hooks, clamps, bolt, screws and the like that directly secure top edge 4 to structure 14.

Returning back to Figure 2, mounting assembly 10 is assembled and used pursuant to the following steps which can be accomplished in a variety of different ordered sequences. In one method of assembly, one or more upper mounting brackets 20 are secured to structure 14 by screwing bolts 138 through corresponding spaced apart apertures 130 and 134 as previously discussed with regard to Figure 5. Next, top edge 4 of display sheet 12 is attached to upper mounting brackets 20 by sliding retention line 46 through coupling channel 60. As a result, display sheet 12 is freely suspended by top edge 4 secured to mounting bracket 20.

Next, a side mounting bracket 20A is coupled with side edge 6 of display sheet 12 by manually sliding retention line 46 within coupling channel 60 thereof. Side mounting bracket 20A can then be secured to structure 14 using the same process as with regard to top mounting brackets 20.

One or more lower braces 24 and side braces 24A are secured to structure 14 by passing bolts 120 through corresponding spaced apart apertures 116 and 118 as previously discussed with regard to Figure 5. Next, one or more adjustment brackets 22, 22A are coupled with bottom edge 5 and side edge 7 of display sheet 12 by sliding retention line 46 through corresponding coupling channel 60. Slidably disposed within each receiving channel 74 of each adjustment bracket 22, 22A are a plurality of coupling pins 100. Each coupling pin 100 is slidably moved along adjustment bracket 22, 22A so as to be aligned with a corresponding opening 88 in adjacent braces 24, 24A. The second end of each coupling pin 100 is then passed through corresponding opening 88 after which washer 124 and advancing nut 126 are screwed onto each end 102 as previously discussed with regard to Figures 4 and 6.

In this configuration, advancing nuts 126 are selectively tightened such that locking pins 100 are advanced through braces 24, 24A. As a result, adjustment brackets 22, 22A are advanced towards braces 24, 24A. In so doing, display sheet 12 is both horizontally and vertically tightened between mounting brackets 20, 20A and adjustment brackets 22, 22A. In alternative embodiments, the present invention envisions that where display sheet 12 is sufficiently long, mounting bracket 20A can be replaced with another set of adjustment bracket 22A and brace 24A. As a result, display 12 would be tightened from both sides. It is also envisioned that top mounting bracket 20 can be replaced with another set of adjustment bracket 22 and brace 24. In yet another embodiment, it is appreciated that display sheet 12 need only be mounted and tightened either between its side edges or between the top and bottom edges.

Once display sheet 12 is tightened, cover 26 is mounted to mounting brackets 20, 20A and adjustment brackets 22, 22A. As depicted in Figure 4, each element of cover 26 comprises a substantially flat base 144 having an angled wing 146 and 148 projecting from the opposing sides thereof. Wing 148 terminates at a rounded end 150 which is configured for positioning over display sheet 12.

The present invention also includes means for securing cover 26 to a corresponding mounting bracket 20, 20A and adjustment bracket 22, 22A. By way of example and not by limitation, as depicted in Figures 2 and 4, a plurality of spaced apart elongated slots 152 extend through linear members 28 and corner members 30 of cover 26. During attachment, each linear member 28 is first aligned over corresponding mounting brackets 20, 20A and adjustment brackets 22, 22A such that elongated slots 152 are aligned over threaded holes 55. A bolt 154 is then passed through each slot 152 and screwed into a corresponding threaded hole 55. As a result, linear members 28 are secured to the mounting and adjustment brackets. Next, corner members 30 are positioned over the ends of adjacent linear members 28. Bolts 154 are then passed through aligned slots 152 so as to screw into holes 55. In alternative embodiments, it is also envisioned that cover 26 can be attached to braces 24, 24A rather than adjustment brackets 22, 22A.

Cover 26 not only provides a nice esthetic finish to mounting assembly 10 but also covers mounting brackets 20, 20A; adjustment brackets 22, 22A; braces 24, 24A; and perimeter edge 33 of display sheet 12 so as to protect these elements from the weather and exterior elements, such as tree branches, that may damage the elements. As depicted in Figure 5, in one embodiment, the maximum lateral distance D_2 between structure 14 on which front face 78 of brace 24 is mounted and the top surface of cover 26 is less than about 7 cm, with less than about 5 cm being preferred, and less than about 3 cm being more preferred.

Depicted in Figure 8 is an alternative embodiment of an inventive mounting assembly 210 incorporating features of the present invention. Mounting assembly 210 is configured for securing a flexible display sheet 212 to a structure 214. In the embodiment depicted, structure 214 comprises a side 216 of a cargo truck 218 similar to cargo truck 18.

Display sheet 212 has a front face 220 that extends to a perimeter edge 222 and can be similar and/or identical to display sheet 12, previously discussed. Although display sheet 212 can have any desired configuration, in the embodiment depicted, display sheet 212 has a substantially rectangular configuration wherein perimeter edge 222 includes a top edge 224, a bottom edge 226, and opposing side edges 228 and 230. Although not required, display sheet 212 can have cut corners 231.

In the embodiment depicted in Figure 9A, display sheet 212 comprises a display portion 232; retention line 234; and means for securing retention line 234 to the perimeter edge of display portion 232. Display portion 232 can be made of the same materials and receive the same type of printing as previously discussed with regard to display portion 40.

Retention line 234 has a diameter that is greater than the thickness of display portion 232. Retention line 234 can have the same configuration and alternatives as previously discussed with regard to retention line 46.

As depicted at the top end of Figure 9A, one embodiment of the means for securing retention line 234 to display portion 232 includes a sleeve 236 having opposing ends folded together so as to enclose retention line 234 and an edge 238 of display portion 232 therebetween. Sleeve 236 has an inside coating of a heat sealing material. Accordingly, as heat is applied to sleeve 236, sleeve 236 bonds to retention line 234 and display portion 232. Sleeve 236 and retention line 234 can be purchased as an integral unit referred to as Keder material which is available from Seattle Industrial Textile Company out of Seattle, Washington.

In the alternative to using a heat sealing material with sleeve 236, other adhesives, staples, stitching, and other conventional mechanisms can also be used to secure sleeve 236 to display portion 232. In another alternative, as depicted in Figure 9B, a single sided sleeve 240 can be used to secure retention line 234 to edge 238. As a result, only one side of display portion 232 is secured to sleeve 240. Single sided sleeve 240 can be easier to align and attach to display portion 232.

Depicted in Figures 9A and 9B, retention line 234 has a substantially circular transverse cross section. As depicted in Figure 9C, sleeve 236 can also be used to secure a retention line 242 having a substantially rectangular transverse cross section or any other desired shape.

In contrast to using a separate sleeve to attach retention line 234, as depicted at the lower end of each of Figures 9A-9C, a lower edge 244 of display portion 232 is folded over to form a loop 246 bounding an elongated compartment 248. Lower edge 244 can be secured to display portion 232 such as by stitching, staples, adhesive, or the like. Once loop 246 is formed, retention line 234 is selectively slid into or out of compartment 248. In the alternative to using loop 246, retention line 234 can be directly secured to lower edge 244 of display portion 232 by stitching, staples, adhesives, or the like.

The present invention also envisions that display sheet 212 need not include a discrete retention line or sleeve. For example, the perimeter edge of display sheet 212 can be substantially flat. As such, display sheet 212 can have a continuous sheet-like configuration. Alternatively, the edges of a display sheet 212 can be rolled up or bunched to form a retention line thereat.

Depicted in Figure 10, mounting assembly 210 includes a mounting bracket 250 and a retention bracket 252. In one embodiment, brackets 250 and 252 are elongated members that are manufactured by extruding and drilling. The members are typically made from aluminum or plastic but can also be made from other materials. Brackets 250 and 252 typically each have a length in a range between about 1 meter to about 3 meters with about 2 meters to about 2.5 meters being more preferred. Typically, members of about 2.5 meters or less are preferred for ease in delivering the assembly through the mail. Brackets 250 and 252 are configured for securing and tensioning display sheet 212 on structure 214 and for simultaneously covering the perimeter edge of display sheet 212. In one embodiment of the present invention, attachment means are provided for removably securing a first edge of display sheet 212 to a structure. By way of example, as depicted in Figure 10, mounting bracket 250 has a body 254. Body 254 includes a front face 256 and an opposing back face 258 each extending between a top side 260 and an opposing bottom side 262. Longitudinally extending through body 254 is a central bore 264. As depicted in Figures 8 and 10, transversely extending between front face 256 and back face 258 in alignment with central bore 264 are a plurality of spaced apart bolt holes 266. Each bolt hole 266 includes a first portion 268 extending from front face 256 to central bore 264 and a concentrically disposed second portion 270 extending from central bore 264 to back face 258. First portion 268 has a diameter greater than the diameter of second portion 270.

A bolt 272 is disposed within each bolt hole 266 such that a threaded shaft 274 of bolt 272 passes through second portion 270 so as to threadedly engage with structure 214. An enlarged head 276 of bolt 272 is configured to pass through first portion 268 and

rest against the surface bounding central bore 264. By tightening each of bolts 272, back face 258 of mounting bracket 250 is secured flush against structure 214.

Body 254 also includes an elongated finger 280 formed along a portion of back face 258 and an elongated thumb 282 formed along bottom side 262. Finger 280 and thumb 282 bound a coupling channel 284 that runs along the length of mounting bracket 250. Coupling channel 284 has a substantially circular transverse cross section and communicates with the exterior through a narrow mouth 286. Coupling channel 284 is configured to slidably receive retention line 234 such that sleeve 236 passes through mouth 286. Retention line 234 has a diameter larger than mouth 286 so as to prevent retention line 234 from passing therethrough. As discussed later in greater detail, coupling channel 284 can have a square, rectangular, or any other polygonal or irregular configuration.

One of the unique features of mounting bracket 250 is that mouth 286 is configured to open towards structure 214 when back face 258 of mounting bracket 250 is disposed against structure 214. Specifically, mouth 286 is configured such that a plane P_3 projecting from a central longitudinal axis A_2 of coupling channel 284 centrally through mouth 286 intersects structure 214 when back face 258 of mounting bracket 250 is disposed against structure 214. Accordingly, a portion of display sheet 212 passing through mouth 286 is angled to intersect with structure 214. This positioning of mouth 286 minimizes the distance D_2 between display sheet 212 and structure 214. In one embodiment, the maximum distance D_2 between display sheet 212 and structure 214 is typically less than about 3 cm with less than about 2 cm being preferred and less than about 1 cm being more preferred.

The present invention also envisions a variety of other embodiments for removably securing a first edge of display sheet 212 to a structure. For example, an elongated bracket can be used such that bolts or screws are passed directly through both the bracket and display sheet 212 so as to secure display sheet 212 to structure 214. As discussed below in greater detail, mounting bracket 250 can also be replaced with retention bracket 252. In other embodiments, coupling channel 284 can be replaced with clips, clamps, hooks, fasteners, snaps, and the like that can be used to secure display sheet 212 to mounting bracket 250. In yet other embodiments, the attachment means can include the corresponding structure as disclosed in United States Patent Nos. 4,558,475; 4,580,361; 5,044,102; 5,373,655; and 5,507,109 which are hereby specifically incorporated by reference.

Finally, mouth 286 can also be configured such that a plane projecting from central longitudinal axis A_2 of coupling channel 284 through mouth 286 is disposed

substantially parallel with structure 214 and/or back face 258 of mounting bracket 250. Mouth 286 can also be disposed so as to outwardly open away from structure 214.

5 Mounting bracket 250 also includes an elongated plate like flange 288 projecting from bottom side 262 of body 254. Flange 288 is disposed in substantially parallel alignment with front face 256. Flange 288 functions to cover and protect top edge 224 of display sheet 212. Mounting bracket 250 has a maximum thickness T extending between front face 256 and back face 258 which is typically less than about 1.9 cm and more preferably less than about 1.4 cm. This thickness T is also the maximum distance that mounting bracket 250 projects from structure 214 when attached thereto.

10 As depicted in Figures 10 and 11, retention bracket 252 includes a body 90 having a flange 292 projecting therefrom. For ease in manufacturing, retention bracket 252 has a configuration substantially similar to mounting bracket 250. Specifically, body 290 has a front face 294 and a back face 296 each extending between a top side 298 and an opposing bottom side 300. Longitudinally extending through body 290 is a central bore 302. A plurality of spaced apart bolt holes 266 extend through retention bracket 252 in the same way as previously discussed above with regard to bolt holes 266 in mounting bracket 250. Bolt holes 266 are used by bolts 304 to secure retention bracket 252 to structure 214.

20 For reasons that will be discussed later in greater detail, a first recessed groove 308 is longitudinally formed along the length of top side 298. Similarly a second recessed groove 310 is formed along the length of bottom side 300. Transversely extending between top side 298 and bottom side 300 are a plurality of spaced apart holes 312. Flange 292 projects from top side 298 and is in substantially parallel alignment with front face 294 of retention bracket 252.

25 In one embodiment of the present invention, means are provided for releasably securing bottom edge 226 of display sheet 212 to retention bracket 252 under a resiliently biased tension. By way of example and not by limitation, a spring 316 is provided having catch 318 formed at a first end 319 and a catch 320 formed at an opposing second end 321 thereof. In the embodiment depicted, catches 318 and 320 are each in the form of a hook. In alternative embodiments, catches 318 and 320 can comprise loops or other conventional catches. As depicted in Figure 11, a plurality of spaced apart cut-outs 324 are formed on display sheet 212 so as to partially expose spaced apart sections of retention line 234. First catch 318 of spring 316 is looped over the exposed portion of retention line 234, thereby securing spring 316 to retention line 234.

35 Means are also provided for securing second end 321 of spring 316 at bottom side 300 of retention bracket 252. By way of example and not by limitation, spring 316 is disposed within hole 312 while second end 321 is pulled out through bottom side 310.

Second catch 320 is then hooked over a brace such as elongated pin 322 having a length greater than the diameter of hole 312. Pin 322 has a central annular groove 325 in which second catch 320 is received. Second recessed groove 310 is configured to receive pin 322 in a nested configuration. In this configuration, each spring 236 is resiliently tensioned between retention line 234 and pin 322 such that display sheet 212 is tensioned between mounting bracket 250 and retention bracket 252.

In the embodiment depicted, spring 316 is comprised of a coiled metal spring. In alternative embodiments, spring 316 can comprise a rubber or elastic band or bands having hooks or other catches formed at the opposing ends thereof. Furthermore, as depicted in Figures 12 and 13, a brace 334 is used to replace pin 322. Brace 334 comprises a narrow elongated plate that is bent in a substantially U or V shaped configuration along its width. As a result, a gap 335 is formed between the face of brace 334 and second end 321 of spring 316. As discussed below, gap 335 enables easy attachment of a tool to second end 321 of spring 316 during attachment and removal of brace 334. In other embodiments, pin 322 can be replaced by a brace of any desired structure, such as a ring, which can be attached to second end 321 of spring 316 and will not pull through a corresponding hole 312. In yet another embodiment, the brace can be eliminated and bottom side 300 can be configured to directly catch second end 321 of spring 316. For example, a small pocket can be formed on bottom side 300 to receive the end of the hook positioned at second end 321 of spring 316.

In yet another embodiment, a bolt is positioned at second end 321 of spring 316 and passed through a corresponding hole 312. An enlarged nut is then threaded onto the bolt so as to bias against bottom side 300 of retention bracket 252. As the nut is tightened, display sheet 212 becomes tensioned between mounting bracket 250 and retention bracket 252.

Also depicted in Figure 12 is an alternative mounting bracket 330. Mounting bracket 330 is similar to mounting bracket 250 and like elements are identified by like reference characters. Mounting bracket 330, however, is distinguished over mounting bracket 250 in that it contains a coupling channel 332 having a substantially rectangular transverse cross section that extends along the length of mounting bracket 330. Coupling channel 332 communicates with the exterior through a narrow mouth 338 that extends through bottom side 262. Slidably disposed within coupling channel 332 is a retention line 336 having a substantially rectangular transverse cross section.

Besides functioning as a passage for springs 316, holes 312 also serve as a drain. Once display 212 is attached to mounting bracket 250 and retention bracket 252, as discussed above, water and dirt will accumulate through normal use between flange 229 of retention bracket 252 and display 212. First recessed groove 308 on retention bracket

252 collects the water and dirt and directs it to holes 312. The water and dirt then passes through holes 312 and away from mounting assembly 210.

Returning back to Figure 8, mounting assembly 210 is assembled and used pursuant to the following steps which can be accomplished in a variety of different ordered sequences. In one method of assembly, one or more mounting brackets 250 are secured to structure 214 by screwing bolts 272 through corresponding spaced apart bolt holes 266 as previously discussed with regard to Figure 10. Next, top edge 224 of display sheet 212 is attached to mounting brackets 250 by sliding retention line 234 through coupling channel 284. As a result, display sheet 212 is freely suspended by top edge 224 secured to mounting bracket 250.

Next, one or more retention brackets 252 are secured to structure 214 by screwing bolts 272 through corresponding spaced apart bolt holes 266 and into structure 214 as previously discussed with regard to Figure 10. Retention brackets 252 are disposed such that when display sheet 212 is tightly drawn, bottom edge 226 is covered by flange 292 of retention bracket 252 and spaced apart from top side 298 of retention bracket 252. It is noted that mounting brackets 250 and retention brackets 252 need not be continuous. For example, shorter mounting brackets 250 and retention brackets 252 can be spaced apart in horizontal alignment, such as between corrugations on the side of a vehicle.

A plurality of springs 316 are then attached to retention line 234 along bottom edge 226 of display sheet 212 as previously discussed with regard to Figures 10 and 11. Springs 316 are spaced apart so that each spring 316 is in alignment with a corresponding hole 312 extending through retention brackets 252. Cut outs 324 make it easy to attached first end 319 of each spring 316 to retention line 234 and also allows lateral movement of springs 316 along the length of retention line 234, thereby enabling easy alignment of springs 316 with corresponding holes 312. In alternative embodiments, however, cut outs 324 are not required. First catches 318 can simply poke through display sheet 212 so as to engage retention line 234.

Next, a tool (not shown), such as a narrow elongated shaft having a hook at the end thereof, is upwardly passed through a hole 312 where it then attaches to second end 321 of a corresponding spring 316. The tool is then drawn back through the hole 312 so that second end 321 of spring 316 is exposed on bottom side 300 of retention bracket 252. Second catch 320 is then hooked over or otherwise attached to a corresponding brace such as pin 322 or brace 334. The tool is then released so that pin 322 or brace 334 is biased against retention bracket 252 by spring 316. In this position, spring 316 is resiliently expanded so that spring 316 produces a resilient bias force against display sheet 212. This same process is repeated along the length of retention brackets 252 such

that the plurality of springs 316 produce a substantially uniform tensioning force that tightens display sheet 212 between mounting brackets 250 and retention brackets 252. In one embodiment, springs 316 are spaced apart in a range between about 15 cm to about 60 cm with about 30 cm to about 45 cm being more preferred.

5 In some embodiments, such as on the side of moving vehicles, it is desired to secure side edges 228 and 230 of display 212 to a structure. In the embodiment depicted in Figure 8, retention brackets 252A are vertically secured to structure 214 adjacent to side edge 228 of display 212. Similarly, retention brackets 252B are vertically secured to structure 214 adjacent to side edge 230 of display 212. Spaced apart springs 316 are
10 then used to secure side edges 228 and 230 to retention brackets 252A and 252B in substantially the same manner as previously discussed with regard to retention bracket 252. As a result, display sheet 212 is horizontally tensioned between retention brackets 252A and 252B.

15 In an alternative embodiment, one or both of retention brackets 252A and 252B can be replaced with mounting brackets 250A and/or 250B. In this embodiment, top edge 224 of display sheet 212 is first slidably received within coupling channel 284 as previously discussed with regard to Figure 10. Next, the retention lines secured to sides edges 228 and 230 of display sheet 212 are slidably received within the coupling channels of mounting brackets 250A and 250B. Bottom edge 226 is then attached to retention
20 bracket 252 as previously discussed with regard to Figure 10.

Once display sheet 212 is secured to the mounting and retention brackets, corner brackets 340 are secured, such as by bolting, over the intersection of the vertically and horizontally disposed retention and mounting brackets. Corner brackets 340 in part function to cover and protect any exposed corner 231 of display sheet 212. Corner
25 brackets 340 also produce a more aesthetic appearance to the intersection of the vertically and horizontally disposed retention and mounting brackets.

Replacement of display sheet 212 is easily and quickly accomplished using substantially reversed steps except that the retention and mounting brackets need not be removed from structure 214. Specifically, pins 322 are separated from springs 316
30 following which springs 316 are removed from retention brackets 252, 252A, and 252B, where applicable. With bottom edge 226 and side edges 228 and 230 freed, top edge 224 of display sheet 212 is simply slid out of coupling channel 284 so as to allow a new display sheet 212 to be slid therein.

35 As depicted in Figure 8, in one embodiment, a short portion 342 of mounting bracket 250B or retention bracket 252B intersects with or is adjacent to mounting bracket 250. During the initial attachment or replacement of display sheet 212, short portion 342 is removed from structure 214. This enables free sliding of top edge 224 of display sheet

212 into coupling channel 284. Once top edge 224 is secured, short portion 342 is reattached. The benefit of using short portion 342 is that only one or two bolts need to be removed to detach short portion 342. In contrast, a significantly larger number of bolt would need to be removed if the full length of mounting bracket 250B or retention bracket 252B had to be removed and then reattached.

The present invention may be embodied in other specific forms without departing from its spirit or essential characteristics. For example, the present invention envisions that the components and elements of mounting assemblies 10 and 210 and the alternatives thereof can be mixed and matched in different combinations. Thus, the described embodiments are to be considered in all respects only as illustrative and not restrictive. The scope of the invention is, therefore, indicated by the appended claims rather than by the foregoing description. All changes which come within the meaning and range of equivalency of the claims are to be embraced within their scope.

What is claimed is:

1. An assembly for mounting a flexible sheet having a perimeter edge to a structure, the assembly comprising:

(a) a bracket having a front face extending between a first end and an opposing second end;

(b) means for securely retaining a portion of the perimeter edge of the flexible sheet along the first end of the bracket;

(c) a brace configured for rigid attachment to the structure; and

(d) means extending between the bracket and the brace for selectively moving the bracket relative to the brace when the brace is rigidly mounted to the structure and the front face of the bracket is slidably disposed directly adjacent to the structure.

2. An assembly as recited in claim 1, wherein the means for securely retaining comprises a channel disposed along the length of the first end of the bracket, the channel communicating with the exterior through a narrow mouth, the channel and mouth being configured to slidably receive the portion of the perimeter edge of the flexible sheet.

3. An assembly as recited in claim 1, wherein the means for selectively moving comprises a bolt having a first end attached to the second end of the bracket and a second end extending through the brace.

4. An assembly as recited in claim 3, further comprising a nut threadedly mounted on the second end of the bolt such that as the nut is tightened, the nut biases against the brace causing the bolt to advance through the brace.

5. An assembly as recited in claim 3, wherein the second end of the bolt is slidably retained along the second end of the bracket.

6. An assembly as recited in claim 1, further comprising a cover including a substantially flat base and a wing projecting at an angle from each opposing side thereof, the cover being configured to substantially enclose the bracket and the brace over the structure when the cover is mounted to the bracket.

7. An assembly for mounting a flexible display sheet having a perimeter edge to a structure, the assembly comprising:

(a) an adjustment bracket having an front face extending between a first end and an opposing second end, the first end bounding a coupling channel extending along the length of the adjustment bracket, the coupling channel communicating with the exterior through a narrow mouth, the mouth being oriented so as to face toward the structure when the front face of the adjustment bracket is biased against the structure;

- (b) a brace configured for rigid attachment to the structure; and
- (c) means extending between the adjustment bracket and the brace for selectively moving the adjustment bracket relative to the brace when the brace is rigidly mounted to the structure.

5 8. An assembly as recited in claim 7, wherein the mouth on the adjustment bracket is configured such that when the front face of the adjustment bracket is biased against the structure and a portion of the perimeter edge of the display sheet is disposed within the coupling channel, the portion of the display sheet extending through the mouth is angled towards the structure.

10 9. An assembly as recited in claim 7, wherein the mouth on the adjustment bracket is configured such that a plane projecting from a central longitudinal axis of the coupling channel through the mouth of the coupling channel intersects the structure when the front face of the adjustment bracket is disposed against the structure.

15 10. An assembly as recited in claim 7, wherein the coupling channel has a substantially circular transverse cross section.

 11. An assembly as recited in claim 7, wherein the means for selectively moving comprises a coupling pin having a first end slidably mounted along the second end of the adjustment bracket and a second end freely extending through the brace.

20 12. An assembly as recited in claim 11, wherein the brace comprises an elongated member having a substantially square transverse cross section and bounding a plurality of openings transversely extending therethrough, the second end of the coupling pin extending through a corresponding one of the openings.

 13. An assembly for mounting a flexible display sheet having a perimeter edge to a structure, the assembly comprising:

25 (a) an adjustment bracket having a first end and an opposing second end;

 (b) means for securely retaining a portion of the perimeter edge of the display sheet at the first end of the adjustment bracket;

30 (c) a brace configured for rigid attachment to the structure, the brace having an opening extending therethrough;

 (d) a coupling pin having a first end and an opposing second end, the first end of the coupling pin being mounted to the second end of the adjustment bracket, the second end of the coupling pin extending through the opening on the brace; and

35 (e) means for selectively advancing the coupling pin through the opening on the brace.

14. An assembly as recited in claim 13, wherein means for securely retaining comprises a coupling channel disposed along the length of the first end of the adjustment bracket, the coupling channel communicating with the exterior through a narrow mouth, the coupling channel and mouth being configured to slidably receive the portion of the perimeter edge of the display sheet.

15. An assembly as recited in claim 13, further comprising a receiving channel disposed along the length of the second end of the adjustment bracket, the receiving channel communicating with the exterior through a narrow mouth, the first end of the coupling pin being slidably disposed within the receiving channel of the bracket.

16. An assembly as recited in claim 15, wherein the receiving channel has a substantially square transverse cross section.

17. An assembly as recited in claim 15, further comprising a retention nut threadedly engaged on the first end of the coupling pin, the retention nut being configured to slidably travel within the receiving channel of the adjustment bracket so as to preclude annular rotation of the retention nut therein.

18. An assembly as recited in claim 17, further comprising a positioning nut threadedly disposed on the coupling pin between the opposing ends thereof, the positioning nut being configured to selectively bias against the exterior surface of the adjustment bracket.

19. An assembly as recited in claim 13, wherein the means for selectively advancing the coupling pin comprises an advancing nut threadedly mounted on the second end of the coupling pin, the advancing nut being configured to bias against the brace so as to advance the coupling pin as the advancing nut is threaded on the coupling pin.

20. An assembly for mounting a display sheet having opposing first and second edges to a structure, the assembly comprising:

(a) an elongated first adjustment bracket having a first end and an opposing second end, the first end being configured to receive and retain at least a portion of the first edge of the display sheet, the second end of the first adjustment bracket having a receiving channel extending along the length thereof;

(b) means for securing the second edge of the display sheet to the structure;

(c) an elongated first brace having a plurality of spaced apart openings extending therethrough; and

(d) a plurality of first coupling pins each having a first end and an opposing second end, the first end of each coupling pin being slidably retained

within the receiving channel at the second end of the first adjustment bracket, the second end of each coupling pin extending through a corresponding opening on the elongated first brace.

21. An assembly as recited in claim 20, wherein the means for securing the second edge of the display sheet to the structure comprises:

(a) a mounting bracket having an front face and a first end, the first end bounding a coupling channel configured to receive the second end of the display sheet; and

(b) means for securing the mounting bracket to the structure such that the front face of the mounting bracket is biased against the structure.

22. An assembly as recited in claim 20, wherein the means for securing the second edge of the display sheet to the structure comprises:

(a) an elongated second adjustment bracket having a first end and an opposing second end, the first end being configured to receive and retain at least a portion of the second edge of the display sheet, the second end of the second adjustment bracket having a receiving channel extending along the length thereof;

(b) an elongated second brace having a plurality of spaced apart openings extending therethrough; and

(c) a plurality of second coupling pins each having a first end and an opposing second end, the first end of each second coupling pin being slidably retained within the receiving channel at the second end of the second adjustment bracket, the second end of each second coupling pin extending through a corresponding opening on the elongated second brace.

23. An assembly as recited in claim 20, further comprising a advancing nut threadedly mounted at the second end of each of the first coupling pins, each advancing nut being configured to bias against the first brace.

24. An assembly as recited in claim 20, further comprising a cover member including a substantially flat base and a wing projecting at an angle from each opposing side thereof, the cover member being configured to substantially enclose the first adjustment bracket and the first brace over the structure when the cover member is mounted to the first adjustment bracket.

25. An assembly for use on a structure, the assembly comprising:

(a) a display sheet having a first edge and an opposing second edge;

(b) a mounting bracket having an front face and a first end, the first end bounding a coupling channel extending along the length of the mounting bracket, the coupling channel communicating with the exterior through a narrow

mouth, the coupling channel and mouth of the mounting bracket being configured to slidably receive a least a portion of the first edge of the display sheet;

(c) means for securing the mounting bracket to the structure such that the front face is biased against the structure;

(d) an adjustment bracket having an front face extending between a first end and an opposing second end, the first end bounding a coupling channel extending along the length of the adjustment bracket, the coupling channel communicating with the exterior through a narrow mouth, the coupling channel and mouth of the adjustment bracket being configured to slidably receive a least a portion of the second edge of the display sheet;

(e) a brace bounding an aperture extending therethrough and having a front face;

(f) means for securing the brace to the structure such that the front face thereof is biased against the structure; and

(g) a coupling pin having a first end and an opposing second end, the first end of the coupling pin being mounted to the second end of the adjustment bracket, the second end of the coupling pin extending through the aperture of the brace.

26. An assembly as recited in claim 25, wherein the mounting bracket and adjustment bracket are configured such that when the display sheet is tightly disposed therebetween, the distance between the flexible sheet and the structure is less than about 2 cm.

27. An assembly as recited in claim 25, wherein the display sheet comprises a retention line disposed at the first edge thereof.

28. An assembly as recited in claim 25, wherein the adjustment bracket and the brace are configured such that the front face of the adjustment bracket is slidably disposed directly adjacent to the structure when the brace is secured to the structure.

29. An assembly for mounting a flexible display sheet having a first edge and an opposing second edge to a structure, the assembly comprising:

(a) an elongated retention bracket configured for rigid attachment to the structure, the retention bracket having a hole transversely extending therethrough; and

(b) means at least partially disposed within the hole for releasably securing the second edge of the display sheet to the bottom bracket under a resiliently biased tension.

30. An assembly as recited in claim 29, further comprising attachment means for removably securing the first edge of the display sheet to the structure.

5 31. An assembly as recited in claim 30, wherein the attachment means comprises a mounting bracket having a channel disposed along at least a portion of the length thereof, the channel communicating with the exterior through a narrow mouth, the channel and mouth being configured to slidably receive at least a portion of the first edge of the flexible sheet.

32. An assembly as recited in claim 29, wherein the means for releasably securing comprises:

0 (a) a spring having a first end and an opposing second end, the spring being selectively disposed within the hole in the retention bracket, the first end of the spring being coupled with the second edge of the display sheet; and

(b) means for securing the second end of the spring to the retention bracket.

5 33. An assembly as recited in claim 32, wherein the means for securing the second end of the spring to the retention bracket comprises a brace removably coupled with the second end of the spring such that the spring biases the brace against the retention bracket.

0 34. An assembly as recited in claim 29, wherein the retention bracket comprises:

(a) an elongated body having a front face and a back face each extending between a top side and an opposing bottom side, the hole extending between the top side and the bottom side; and

5 (b) a flange outwardly projecting from the front face of the body between the hole and the front face.

35. An assembly for mounting a flexible sheet having a first edge and an opposing second edge to a structure, the assembly comprising:

0 (a) a mounting bracket configured for rigid attachment to the structure, the mounting bracket having a channel disposed along at least a portion of the length thereof, the channel communicating with the exterior through a narrow mouth, the channel and mouth being configured to slidably receive at least a portion of the first edge of the flexible sheet;

5 (b) a retention bracket configured for rigid attachment to the structure, the retention bracket having a body with a top side and an opposing bottom side, a plurality of spaced apart holes extend through the body between the top side and the bottom side;

(c) a spring having a first end and an opposing second end, at least a portion of the spring be selectively disposed within a corresponding hole of the retention bracket, the first end of the spring being attachment to the second edge of the display sheet; and

(d) means for securing the second end of the spring at the bottom side of the retention bracket.

36. An assembly as recited in claim 35, wherein the channel of the mounting bracket has a substantially circular transverse cross section.

37. An assembly as recited in claim 35, wherein the mounting bracket comprises:

(a) an elongated body having a front face and a back face each extending between a top side and an opposing bottom side; and

(b) a flange outwardly projecting from the body.

38. An assembly as recited in claim 37, wherein the mouth to the channel is disposed at the intersection of the bottom side and front face of the body of the mounting bracket.

39. An assembly as recited in claim 35, wherein the retention bracket comprises a flange outwardly projecting from the top side thereof along the length of the retention bracket.

40. An assembly as recited in claim 35, further comprising a first grooved recess longitudinally formed on the top side of the retention bracket, the first grooved recess intersecting the corresponding hole.

41. An assembly as recited in claim 35, further comprising a second grooved recess longitudinally formed on the bottom side of the retention bracket, the second grooved recess intersecting the corresponding hole.

42. An assembly as recited in claim 35, wherein the spring comprises a coiled metal strand.

43. An assembly as recited in claim 35, wherein the means for securing the second end of the spring at the bottom side of the retention bracket comprises an elongated pin, the pin having a length greater than the diameter of the corresponding hole.

44. An assembly as recited in claim 35, wherein the means for securing the second end of the spring at the bottom side of the retention bracket comprises an elongated narrow plate having a substantially V-shaped bend across its width.

45. An assembly for use on a structure, the assembly comprising:

(a) a display sheet having a first edge an opposing second edge;

(b) an elongated mounting bracket having a channel disposed along at least a portion of the length thereof, the channel communicating with the

exterior through a narrow mouth, the channel and mouth being configured to slidably receive at least a portion of the first edge of the display sheet;

(c) an elongated retention bracket having a top side and an opposing bottom side, a hole extending between the top side and the bottom side;

(d) a spring having a first end and an opposing second end, the spring being disposed within the hole of the retention bracket, the first end of the spring being coupled with the second edge of the display sheet; and

(e) a brace coupled with the second end of the spring such that the spring biases the brace against the bottom side of the retention bracket.

46. An assembly as recited in claim 45, wherein a retention line is disposed along at least one of the first edge and the second edge of the display sheet.

47. An assembly as recited in claim 46, wherein the retention line has a substantially four sided transverse cross section.

48. An assembly as recited in claim 45, wherein the display sheet has a loop formed along at least one of the first edge and the second edge, a retention line being disposed within loop.

49. An assembly as recited in claim 45, wherein the mounting bracket comprises:

(a) an elongated body having the channel formed therein; and

(b) an elongated flange projecting from the body, the first edge of the display sheet being disposed between flange and the structure when the mounting bracket is secured to the structure.

50. An assembly as recited in claim 45, wherein the mouth of the mounting bracket is angled to face toward the structure when the mounting bracket is secured to the structure.

51. An assembly as recited in claim 45, wherein the spring is comprised of an elastomeric material.

52. An assembly as recited in claim 45, wherein the brace comprises an elongated pin.

53. A method comprising the steps of:

(a) sliding the top edge of a display sheet within a channel formed on mounting bracket such that the display sheet is supported by the mounting bracket, the mounting bracket being fixed on a structure;

(b) attaching a first end of a spring to a bottom edge of the display sheet; and

(c) securing a second end of the spring to a retention bracket such that the display sheet is tensioned between the mounting bracket and the retention bracket.

54. A method as recited in claim 53, wherein the securing step comprises:

(a) passing the second end of the spring through a hole in the retention bracket; and

(b) securing the second end of the spring to a brace such that the spring biases the brace against the retention bracket.

55. A method as recited in claim 53, further comprising the steps of

(a) attaching a first end of a second spring to a side edge of the display sheet; and

(c) securing a second end of the second spring to a second retention bracket disposed adjacent to the side edge of the display sheet.

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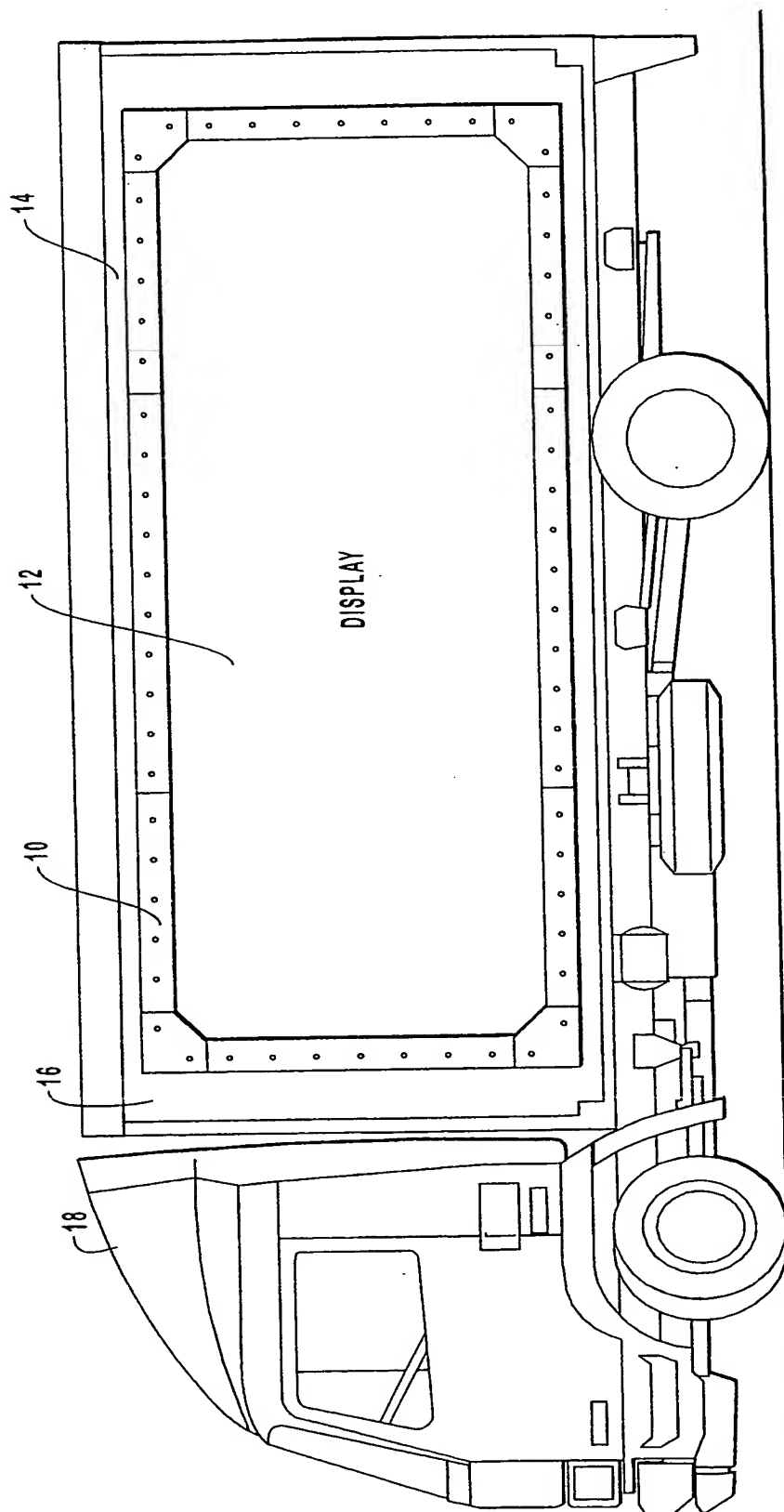


FIG. 1

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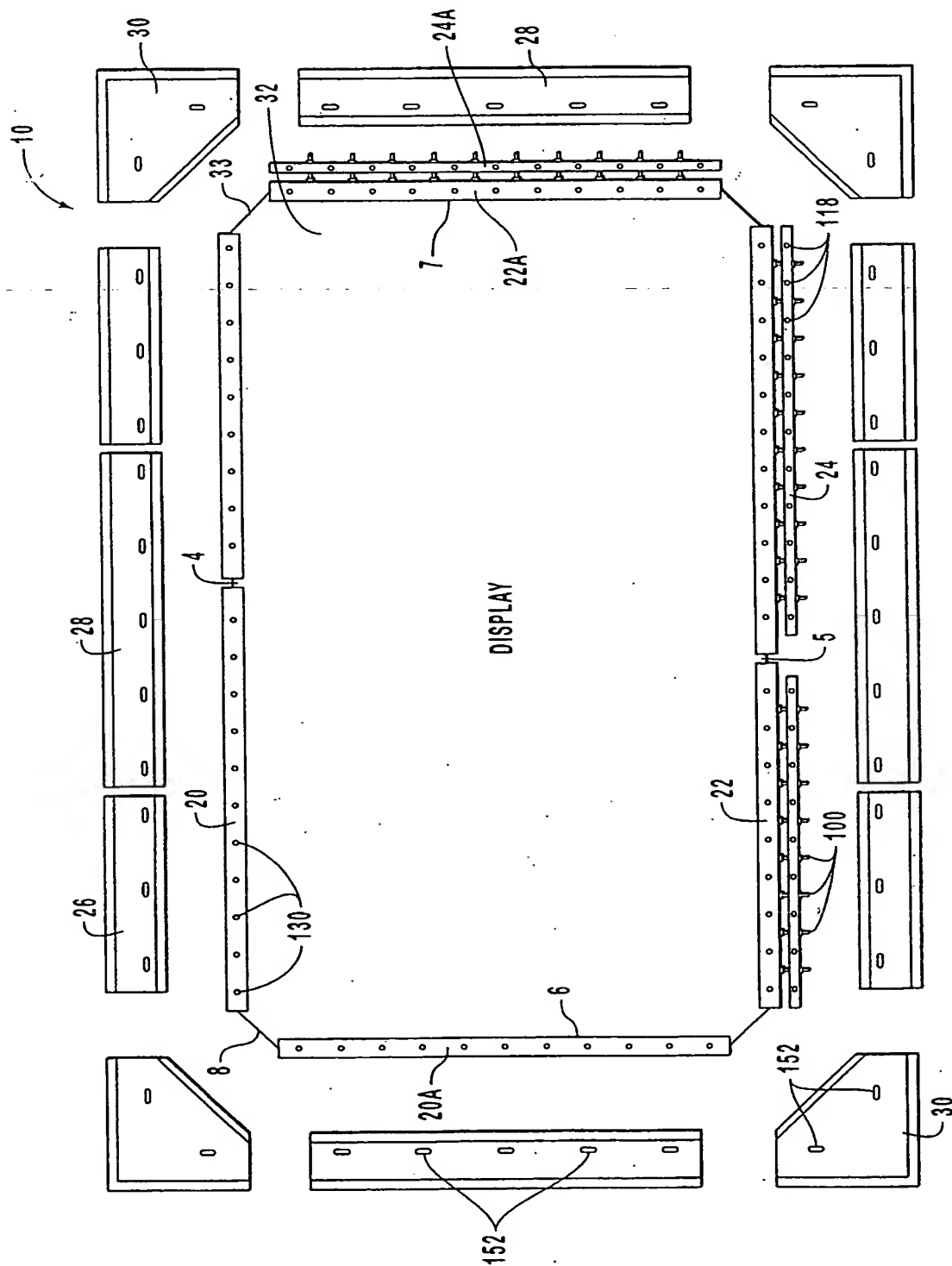


FIG. 2

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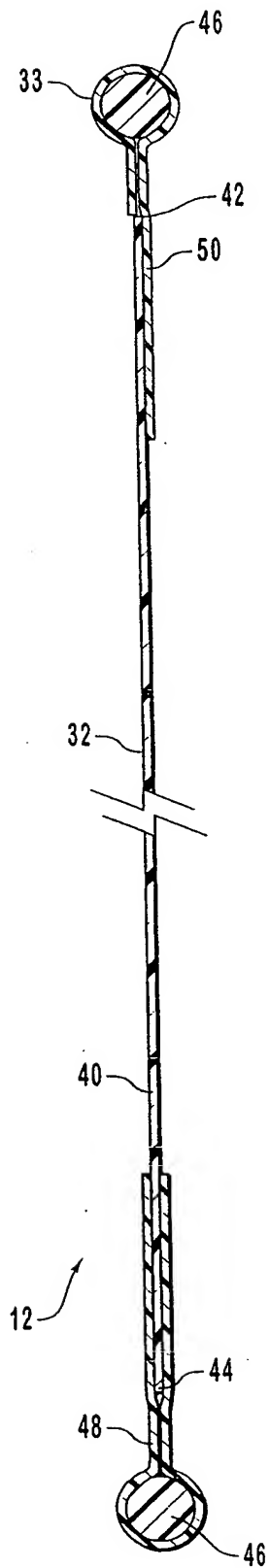


FIG. 3

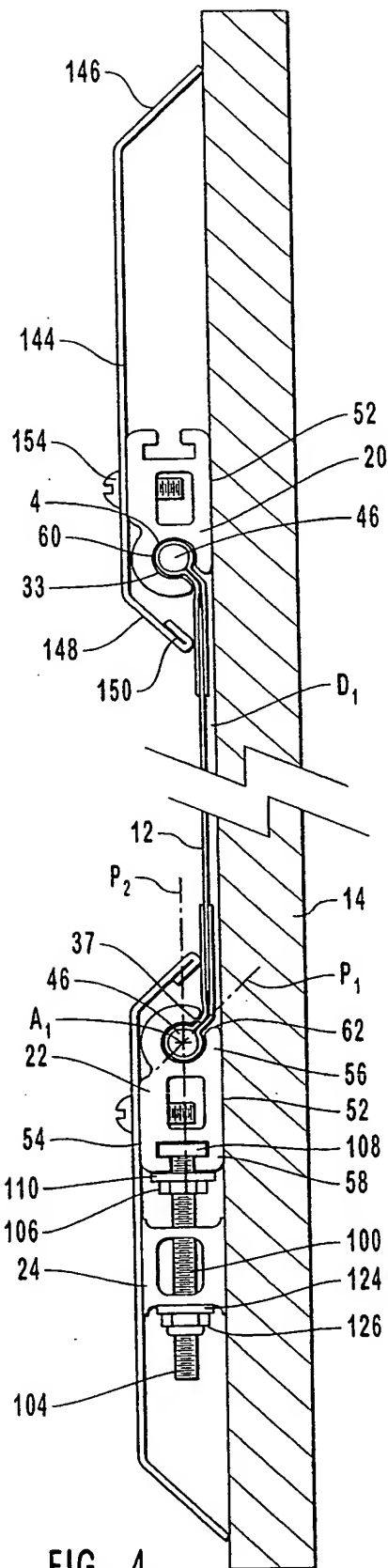


FIG. 4

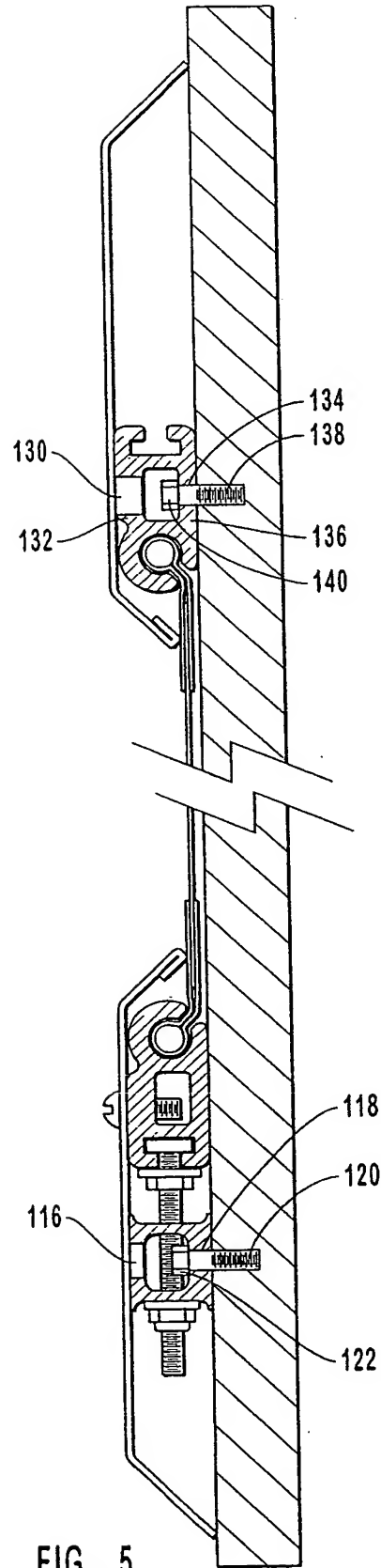


FIG. 5

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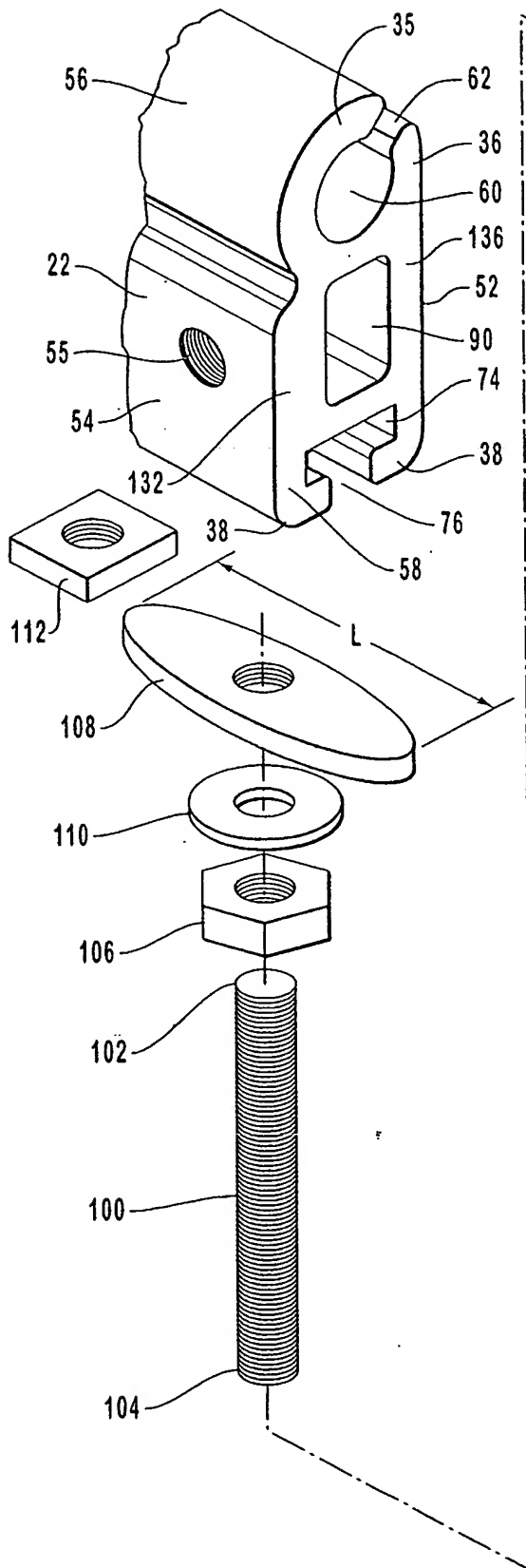


FIG. 6

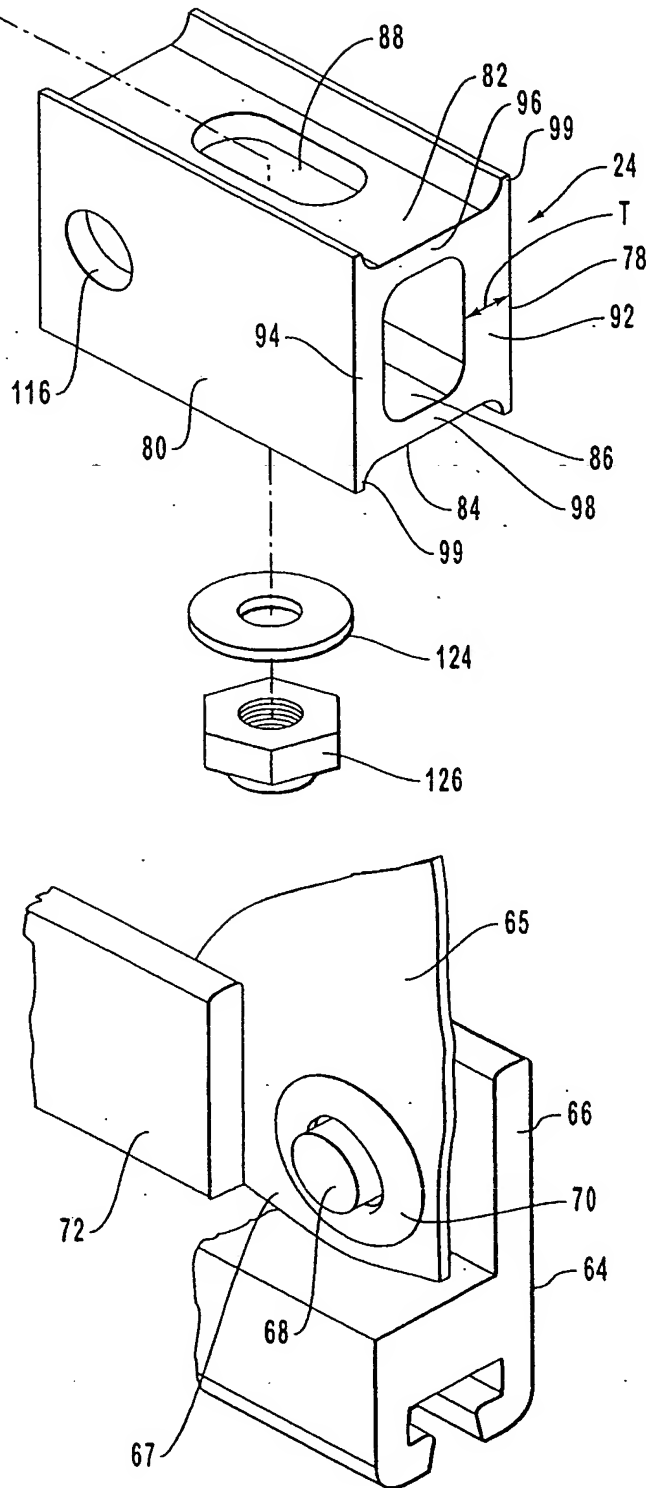


FIG. 7

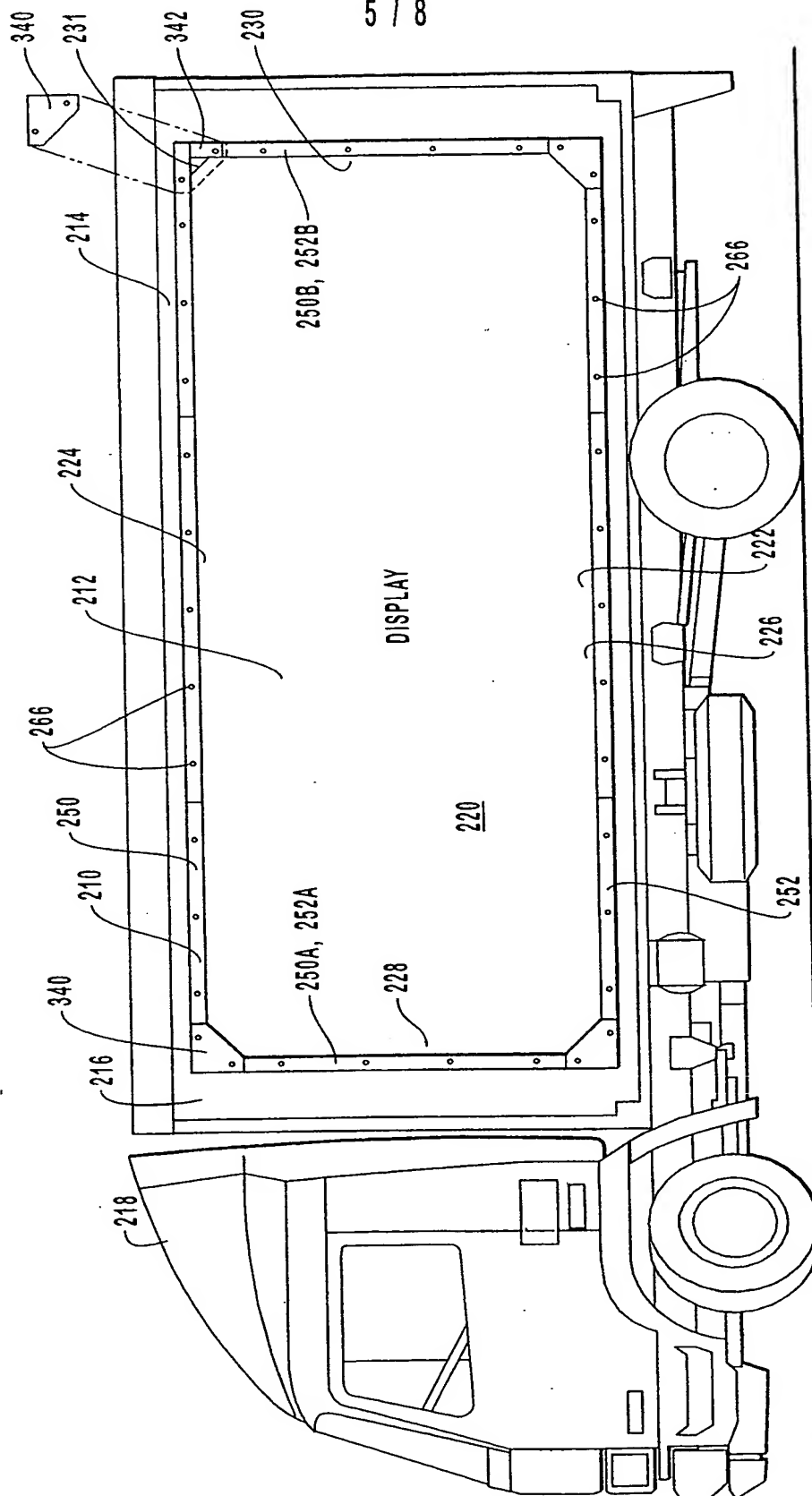


FIG. 8

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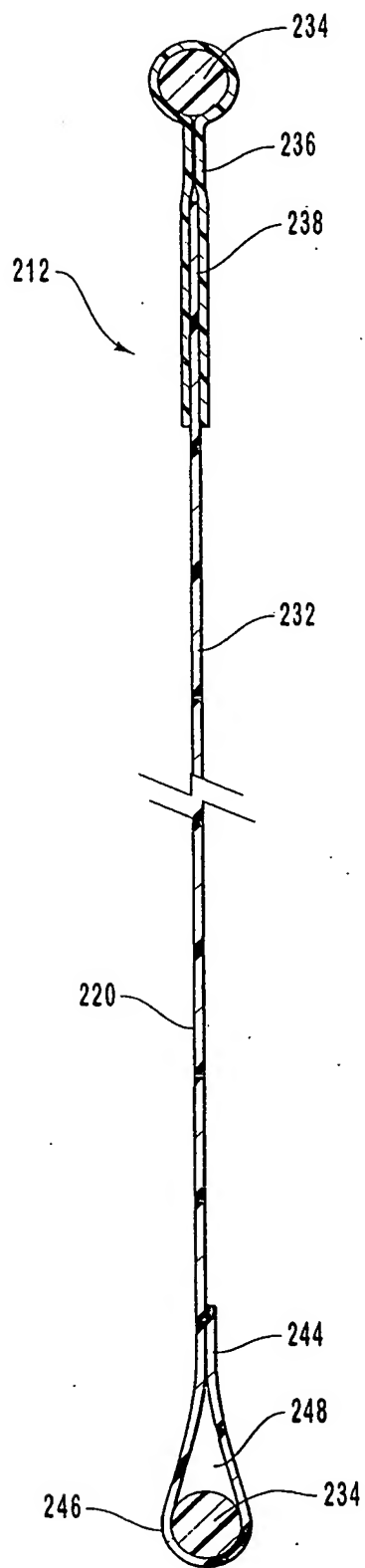


FIG. 9A

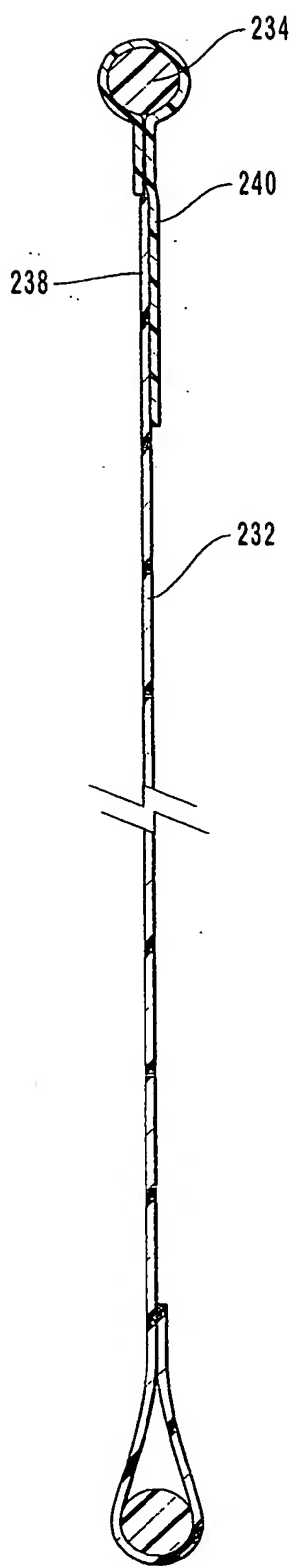


FIG. 9B

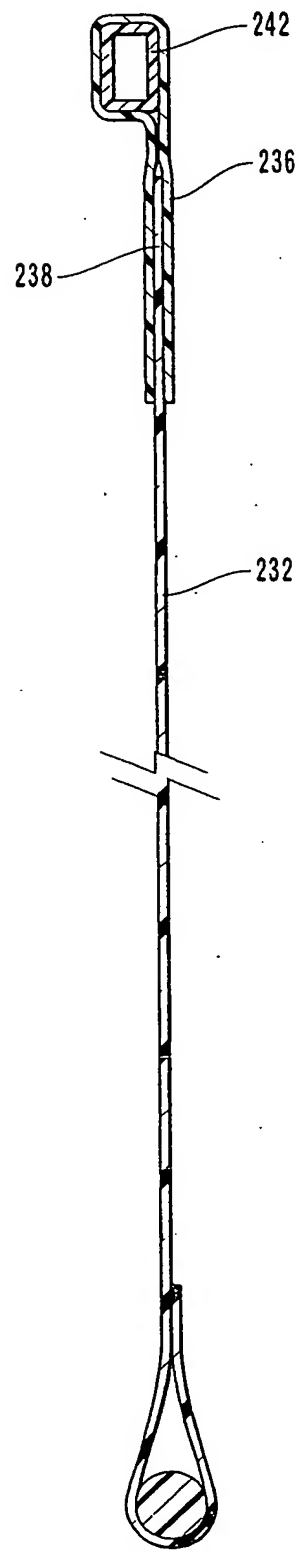


FIG. 9C

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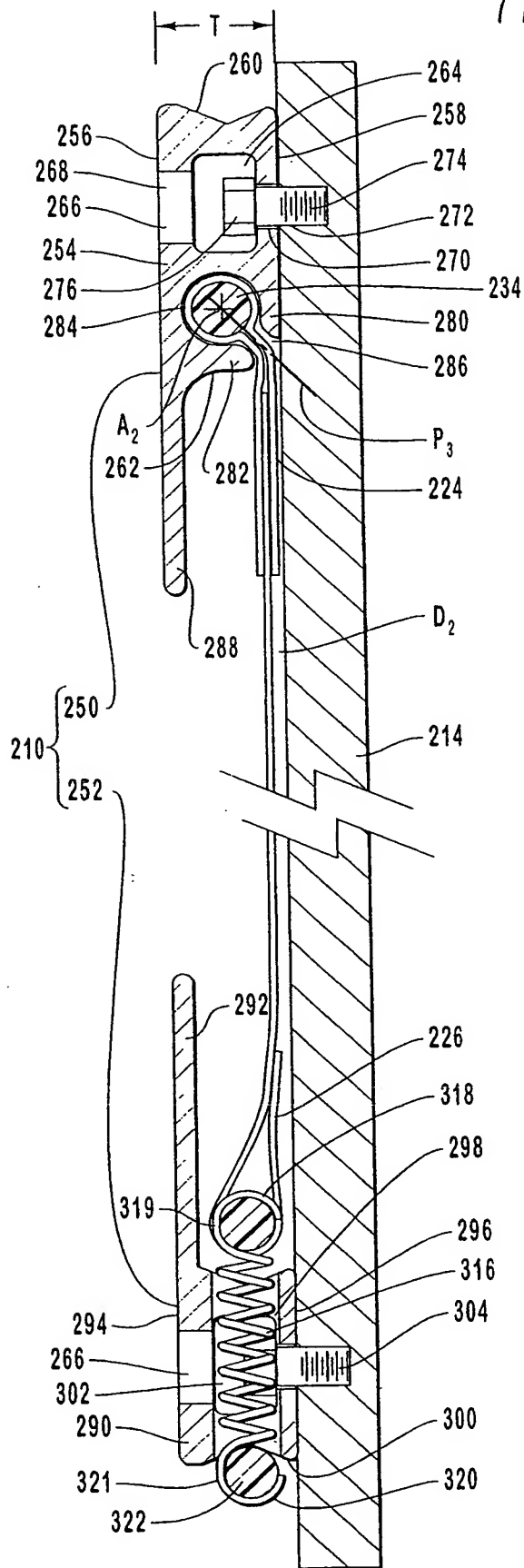


FIG. 10

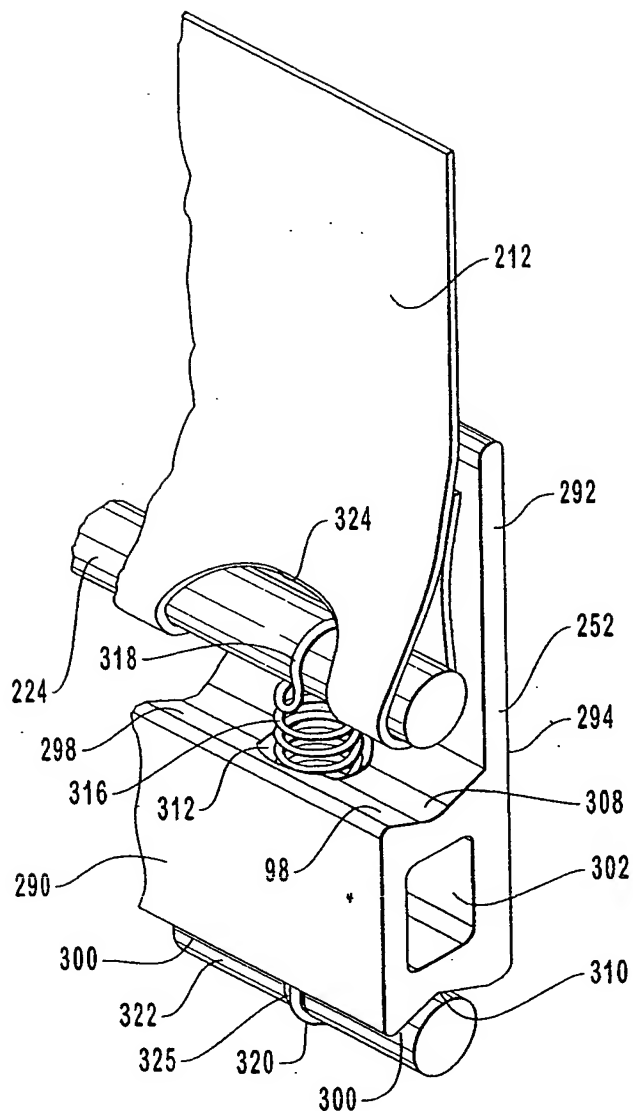


FIG. 11

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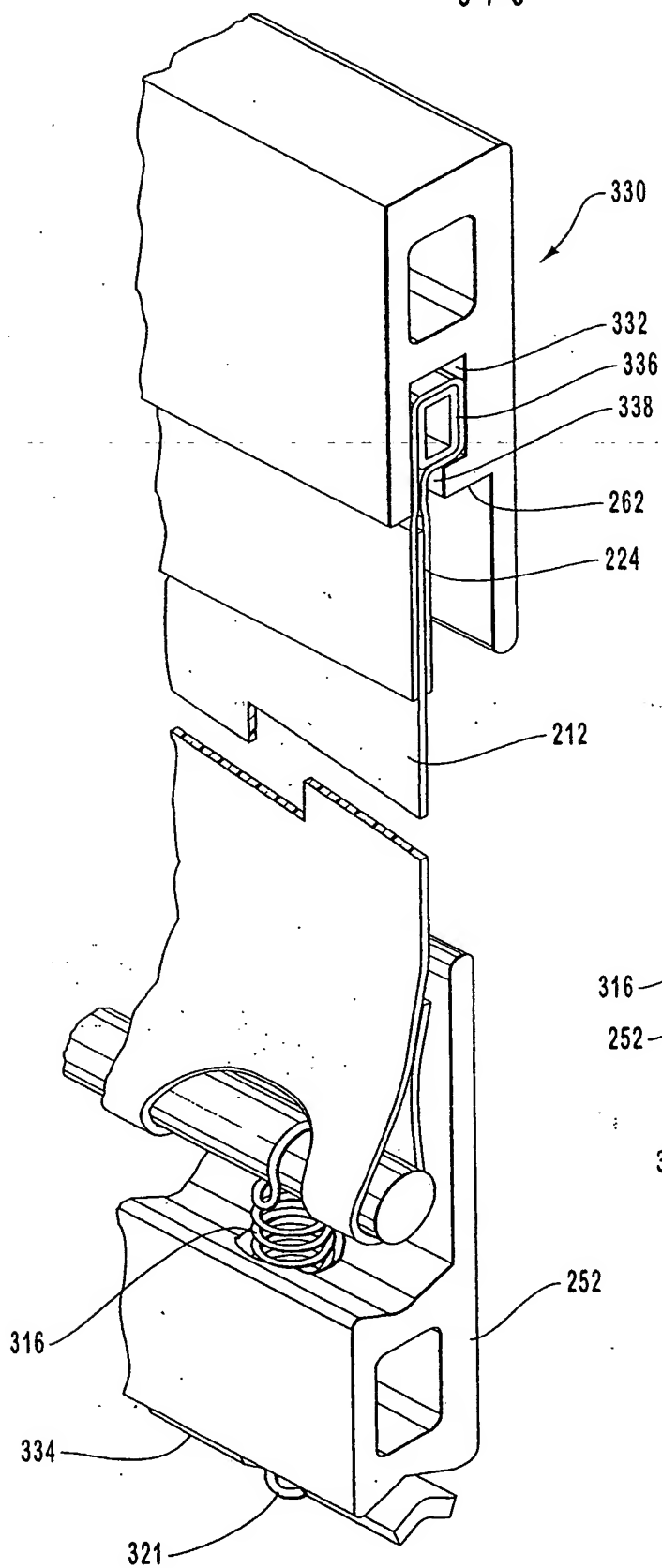


FIG. 12

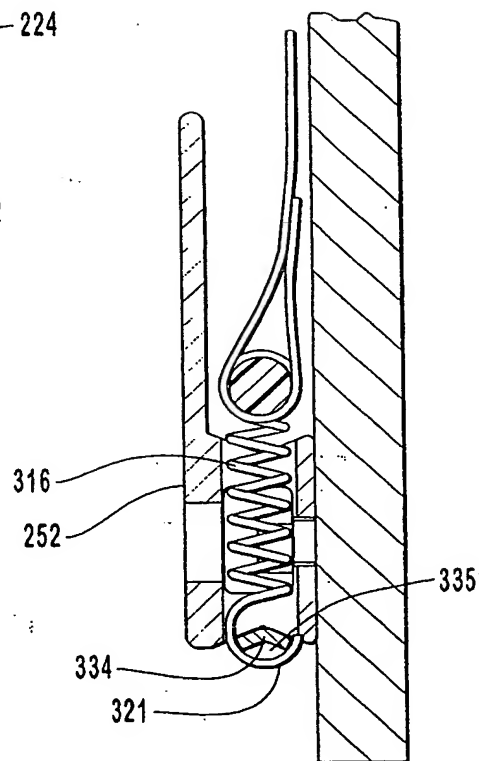


FIG. 13

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US00/07206

A. CLASSIFICATION OF SUBJECT MATTER

IPC(7) : G09F 17/00

US CL : 40/603, 590, 604

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

U.S. : 40/603, 590, 604, 591; 160/328, 371, 378

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X -- Y	US 5,685,099 A (FAVATA) 11 November 1997 (11.11.97), Figure 2.	1-16, 19, 25-31, and 34 -- 32, 33, 35-39, 42, 43, and 45-55
Y	US 4,580,361 A (HILLSTROM ET AL.) 08 April 1986 (08.04.86), Figure 12.	32, 33, 35-39, 42, 43, and 45-55
A	US 4,922,988 A (LOOMIS) 08 May 1990 (08.05.90), Figures 2 and 4.	4, 19
A	US 5,373,653 A (SUZUKI) 20 December 1994 (20.12.94), Figure 9.	1-55

☒ Further documents are listed in the continuation of Box C. ☐ See patent family annex.

* Special categories of cited documents:	*T* later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
A document defining the general state of the art which is not considered to be of particular relevance	*X* document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
E earlier document published on or after the international filing date	*Y* document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
L document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)	*A* document member of the same patent family
O document referring to an oral disclosure, use, exhibition or other means	
P document published prior to the international filing date but later than the priority date claimed	

Date of the actual completion of the international search

05 MAY 2000

Date of mailing of the international search report

21 JUN 2000

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INTERNATIONAL SEARCH REPORT

International application No.
PCT/US00/07206

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A,E	US 6,041,535 A (HOLLOWAY ET AL.) 28 March 2000 (28.03.00), Figure 2.	1-55
A	US 5,046,545 A (LOOMIS ET AL.) 10 September 1991 (10.09.91), Figures 2 and 4.	6 and 19

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